

CRANBERRY THE HEALTHY BERRY

RESEARCH UPDATE

The Many Health Benefits of Cranberry; Anti-adhesion, Antioxidant, & Beyond

For centuries the cranberry has been recognized for its inherent health benefits but only recently has it been scientifically studied. Since 1984, there have been a number of discoveries on the health benefits of cranberries and the list is growing. Perhaps the most widely recognized health benefit for cranberries is their anti-adhesion effect on certain bacteria. Decas Botanical Synergies cranberry-based powders contain natural cranberry compounds called proanthocyanidins (PACs). PACs are the compounds believed responsible for the anti-stick mechanism that allows cranberry to help maintain urinary tract, gut, and oral health. Cranberry PACs disable harmful bacteria in the body so the “bugs are simply swept away.”

Though cranberry is most well known for its ability to support urinary tract health, an ever increasing dossier of emerging science has shown that cranberries may also provide health benefits throughout the body. Its dual anti-adhesion and antioxidant properties have established the cranberry with the status as the healthy berry.



URINARY TRACT

MAY 1984 JOURNAL OF UROLOGY

While trying to account for cranberry juice's unique urinary tract health benefits, Youngstown State University researchers demonstrate that the benefits may be related to the cranberry's ability to inhibit bacteria from adhering to the walls of the urinary tract. The researchers found that 15 ounces of cranberry juice cocktail significantly inhibited the E. coli bacteria, which cause 80 to 90 percent of UTIs, from adhering to the urinary tract.

SOBOTA AE, INHIBITION OF BACTERIAL ADHERENCE BY CRANBERRY JUICE: POTENTIAL USE FOR THE TREATMENT OF URINARY TRACT INFECTIONS. JOURNAL OF UROLOGY 1984; 131:1013-1016

MAY 1991 NEW ENGLAND JOURNAL OF MEDICINE

Tel Aviv University researchers also describe the anti-E. Coli adherence property of cranberry juice and attempt to identify the specific components in cranberries that cause this beneficial effect. They conclude that a compound in cranberries of an "unknown nature" prevents certain E. coli from adhering to the bladder's lining. Orange, pineapple, mango, guava, and grapefruit juices did not possess this anti-adhesion property.

OFEK I, GOLDHAR J, ZAFRIRI D, LIS H, ADAR R, SHARON N, ANTI-ESCHERICHIA COLI ADHESION ACTIVITY OF CRANBERRY AND BLUEBERRY JUICES. NEW ENGLAND JOURNAL OF MEDICINE 1991; 324:1599.

MARCH 1994 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Harvard Medical School researchers conduct the first well-controlled, large-scale clinical trial to demonstrate that drinking cranberry juice cocktail regularly, significantly reduced the presence of bacteria in the urine. The researchers found that the effect was not because of more acidic urine (the urine of the cranberry juice drinkers was no more acidic than those drinking a non-cranberry placebo drink) and speculated that there was something specific in cranberry that prevented bacteria from adhering to the urinary tract. This research was conducted with 153 women, average age of 78, using 10 ounce of Ocean Spray Cranberry Juice cocktail, which contained 27 percent cranberry juice.

AVORN J, MONANE M, GURWITZ JH, GLYNN RJ, CHODNOVSKIY I, LIPSITZ LA, DEDUCTION OF BACTERIURIA AND PYURIA AFTER INGESTION OF CRANBERRY JUICE. JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION 1994; 271:751-754

FEBRUARY 1997 JOURNAL OF FAMILY PRACTICE

In a small, double-blind clinical trial, researchers from Weber State University found that sexually active women between the ages of 18 and 45 who daily consume a cranberry dietary supplement (from spray-dried cranberry juice) for six months had a significantly lower risk of UTIs than women taking a placebo.

WALKER EB, BARNEY DP, MICKERLSEN JN, WALTON RJ, MICKELSEN RAJR. CRANBERRY CONCENTRATE: UTI PROPHYLAXIS. JOURNAL OF FAMILY PRACTICE 1997; 45:167-168.

OCTOBER 1998 NEW ENGLAND JOURNAL OF MEDICINE

Rutgers-led scientists identify the active components in cranberries responsible for maintaining urinary tract health as proanthocyanidins or condensed tannins. The researchers concluded that the cranberry Vaccinium proanthocyanidins in cranberry juice are responsible for promoting urinary tract health.

HOWELL AB, VORSA N, MARDEROSIAN AD, FOO LY, INHIBITION OF THE ADHERENCE OF P-FIMBRIATED ESCHERICHIA COLI TO UROEPITHELIAL-CELL SURFACES BY PROANTHOCYANIDIN EXTRACTS FROM CRANBERRIES. NEW ENGLAND JOURNAL OF MEDICINE 1998; 339:1085

APRIL 2001 FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY

Research led by Rutgers University researchers presented at Experimental Biology 2001 confirms that cranberry Vaccinium proanthocyanidins are absorbed in the body. This suggests that once cranberry proanthocyanidins are absorbed into the bloodstream they become available to other sites throughout the body and may function as anti-adhesion agents and/or antioxidants. For the first time, in vivo research helps confirm the role of cranberry compounds as the active compounds responsible for anti-adhesion of certain E. coli bacteria in the urinary tract. An animal model was used to perform this research.

HOWELL AB, LEAHY M, KUROWSKA E, GUTHRIE N. IN VIVO EVIDENCE THAT CRANBERRY PROANTHOCYANIDINS INHIBIT ADHERENCE OF P-FIMBRIATED E. COLI BACTERIA TO UROEPITHELIAL CELLS. FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY JOURNAL 2001; 15:A284



JUNE 2001 – BRITISH MEDICAL JOURNAL

Research from the University of Oulu, Finland, found that regular consumption of a cranberry juice beverage reduced the recurrence of UTIs by about half, in women studied. One hundred fifty women who have had at least one UTI in their lifetime with the median age of 30 were used in this study. This adds to the body of research supporting cranberry's preventative role with these infections.

KONTIOKARI T, SUNDOVIST K, NUUTINEN M, POKKA T, UHARI M. RANDOMISED TRIAL OF CRANBERRY-LINGONBERRY JUICE AND LACTOBACILLUS GG DRINK FOR THE PREVENTION OF URINARY TRACT INFECTIONS IN WOMEN. BRITISH MEDICAL JOURNAL 2001; 322:1571-1575.

JUNE 2002 – CANADIAN JOURNAL OF UROLOGY

A University of British Columbia urologist found use of cranberry juice and tablets with increased fluid are more effective than fluids alone in preventing UTIs in women studied. Forty percent fewer women experienced UTIs when receiving cranberry products vs. placebo, and on average had half the number of UTIs. Antibiotic use was less in the cranberry group vs. placebo. The researcher recommended that cranberry products be offered as an option in the management of recurrent UTIs.

STOTHERS L. A RANDOMIZED TRIAL TO EVALUATE EFFECTIVENESS AND COST EFFECTIVENESS OF NATUROPATHIC CRANBERRY PRODUCTS AS PROPHYLAXIS AGAINST URINARY TRACT INFECTION IN WOMEN. CANADIAN JOURNAL OF UROLOGY 2002; 9:1558-1562.

JUNE 2002 - JOURNAL OF AMERICAN MEDICAL ASSOCIATION

Findings by researchers suggest that the regular consumption of cranberry juice cocktail may offer protection against certain antibiotic resistant bacteria that cause urinary tract infections (UTIs). This latest research, conducted jointly between Rutgers and the University of Michigan, suggests that regular consumption of cranberry juice cocktail could reduce the potential development of UTIs, thus decreasing the rate of antibiotic resistance.

HOWELL AB, FOXMAN B. CRANBERRY JUICE AND ANTIADHESION OF ANTIBIOTIC RESISTANT UROPATHOGENES. JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION 2002; 287:3082-3083.

MARCH 2003 – AMERICAN JOURNAL OF CLINICAL NUTRITION

Research from the University of Oulu, Finland found frequent consumption of fresh berry juices to be associated with lowered risk for recurrence of UTIs. Dietary habits seem to be an important risk factor for UTI recurrences in women, and dietary guidance could be a first step towards prevention.

KONTIOKARI T, LATINEN J, JARVI L, POKKA T, SUNDOVIST K, UHARI M, DIETARY FACTORS PROTECTING WOMEN FROM URINARY TRACT INFECTION. AMERICAN JOURNAL OF CLINICAL NUTRITION 2003; 77:600-604.

JANUARY 2004 – COCHRANE DATABASE SYSTEMATIC REVIEWS

The Cochrane Collaboration published a research review, concluding that there is some evidence that cranberry may decrease the number of symptomatic UTIs in women. The Cochrane Collaboration is a non-profit organization based in the UK whose mission is to help people make well-informed decisions about healthcare by developing systematic reviews of the effects of healthcare interventions.

JEPSON RG, MIHALJEVIC L, CRAIG J, CRANBERRIES FOR PREVENTING URINARY TRACT INFECTIONS. COCHRANE LIBRARY 2004; 1:1-19.

AUGUST 2004 - NATIONAL MEETING OF THE AMERICAN CHEMICAL SOCIETY

Researchers from Rutgers and the University of Wisconsin investigated the anti-adhesion effects of cranberry juice cocktail versus other foods that contain proanthocyanidins (PACs). In this human study, they found that only consumption of cranberry juice cocktail resulted in urine with microbial anti-adhesion activity. Grape and apple juices, green tea and chocolate were also tested and did not produce this anti-adhesion activity. The researchers found that cranberry proanthocyanidins contained a unique structure feature that may account for this unique microbial anti-adhesion property.

HOWELL AB, REED JD, MCHENRY B, KRUEGER CG, CUNNINGHAM DG, BACTERIAL ANTI-ADHESION ACTIVITY OF CRANBERRY VS. OTHER FOODS, AMERICAN CHEMICAL SOCIETY NATIONAL MEETING 2004.

NOVEMBER 2005 – WORLD JOURNAL OF UROLOGY

This double blind study shows that cranberry juice supplementation can provide a degree of protection against adhesion to epithelial bladder cells by various E. coli strains. This protective effect is independent from antibiotic resistance and the type P pili genetic determinants presence.

P. DI MARTINO, R. AGNIEL, K. DAVID, C. TEMPLER J. L. GAILLARD, P. DENYS, H. BOTTO. REDUCTION OF ESCHERICHIA COLI ADHERENCE TO UROEPITHELIAL BLADDER CELLS AFTER CONSUMPTION OF CRANBERRY JUICE: A DOUBLE-BLIND RANDOMIZED PLACEBO-CONTROLLED CROSS-OVER TRIAL; WORLD JOURNAL OF UROLOGY (2005)

2006 JOURNAL OF CHEMOTHERAPY

An investigation included 20 children who were given prophylaxis with a special extract of cranberry with a high concentration of phenols and vitamin C. Altogether the children had previously had 63 episodes of UTI. During the beginning of the prophylaxis all recovered from the reflux with negative instrumental examinations. During the prophylaxis three episodes of UTI were found in different patients, because therapy with cranberry had been stopped.

V. FANOS, A. ATZEI, M. ZAFFANELLO, A. PIRAS, L. CATALDI, CRANBERRY PREVENTION OF URINARY TRACT INFECTIONS IN CHILDREN. JOURNAL OF CHEMOTHERAPY 2006; 3:21-24.



DECEMBER 2006 PHYTOMEDICINE

This open label pilot study examined the ability of a concentrated cranberry preparation to prevent UTIs in women with a history of recurrent infections. The study concluded a cranberry preparation with a high phenolic content may completely prevent UTIs in women who are subject to recurrent infections.

DAVID T. BAILEY, CAROL DALTON, F. JOSEPH DAUGHERTY, MICHAEL S. TEMPESTA, CAN A CONCENTRATED CRANBERRY EXTRACT PREVENT RECURRENT URINARY TRACT INFECTIONS IN WOMEN? PHYTOMEDICINE 2007;14:237-241.

2007 DRUGS OF TODAY

There is a strong in vitro and in vivo evidence confirming the hypothesis that UTIs can be prevented by decreasing bacterial adherence to uroepithelial cells. For people with recurrent uncomplicated UTIs, routine utilization of cranberry products may offer an alternative methodology to antibiotic prophylaxis.

VINCENT M. SANTILLO, FRANKLIN C. LOWE, CRANBERRY JUICE FOR THE PREVENTION AND TREATMENT OF URINARY TRACT INFECTIONS. DRUGS OF TODAY 2007; 43 (1): 47-54.

FEBRUARY 2007 JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

This study assessed the effect of an 8 week consumption of dried cranberry juice (DCJ) on 65 healthy young women. A 1200 mg amount of DCJ/day resulted in a statistically significant decrease in serum levels of advanced oxidations protein products. Researchers concluded cranberry fruits are effective not only in the prevention of urinary tract infection but also for the prevention of oxidative stress.

K. VALENTOVA, D. STEJSKAL, P. BEDNAR, J. VOSTALOVA, C. CIHALIK, R. VECEROVA, D. KOUKALOVA, M. KOLAR, R. REICHENBACK, L. SKNOURIL, J. ULRICHOVA, V. SIMANEK, BIOSAFETY, ANTIOXIDANT STATUS, AND METABLITES IN URINE AFTER CONSUMPTION OF DRIED CRANBERRY JUICE IN HEALTHY WOMEN: A PILOT DOUBLE-BLIND PLACEBO-CONTROLLED TRIAL. JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY. P. 7.2-7.3

MARCH 2007 MOLECULAR NUTRITION & FOOD RESEARCH

A group of Proanthocyanidins (PACS) with A-type linkages were isolated from cranberry which exhibit bacterial antiadhesion activity against both antibiotic susceptible and resistant strains of uropathogenic P-fimbriated Escherichia coli bacteria. The study further establishes the link between cranberry ingestion and maintenance of urinary tract health.

HOWELL AB, BIOACTIVE COMPOUNDS IN CRANBERRIES AND THEIR ROLE IN PREVENTION OR URINARY TRACT INFECTIONS. MOLECULAR NUTRITION & FOOD RESEARCH 2007; 51:732-737.

JULY 2007 PATHOLOGIE BIOLOGIE

Among cranberry compounds, a group of Proanthocyanidins (PACs) with A-type linkages were isolated which exhibit bacterial anti-adhesion activity against uropathogenic Escherichia coli strains. These PAC inhibit P-fimbriae synthesis and induce a bacterial deformation.

J.-P. LAVIGNE, G. BOURG, H. BOTTO, A. SOTTO. CRANBERRY (VACCINIUM MACROCARPON) AND URINARY TRACT INFECTIONS: STUDY MODEL AND REVIEW OF LITERATURE. PATHOLOGIE BIOLOGIE 2007; 55: 460-464.

AUGUST 2007 EUROPEAN JOURNAL OF CLINICAL MICROBIOLOGY & INFECTIOUS DISEASES

Current evidence favours an antibacterial role for the cranberry's natural polyphenols or tannins. Many studies of prevention have been complicated due to the enrollment of patients who have had complicated urinary tracts, and outcomes have not been consistently favourable. In contrast, significant prevention has been shown for acute cystitis among high-risk young females.

N. CIMOLAI, T. CIMOLAI, THE CRANBERRY AND THE URINARY TRACT. EUROPEAN JOURNAL OF CLINICAL MICROBIOLOGY & INFECTIOUS DISEASES 2007; 26:767-776.

APRIL 2008 CLINICAL MICROBIOLOGY AND INFECTION

This study evaluated the antibacterial efficacy of the consumption of cranberry capsules vs. placebo in the urine of healthy volunteers. A significant dose-dependent decrease in bacterial adherence in vitro was noted after the consumption of 108 and 36 mg of cranberry. The in-vivo model confirmed that E. coli strains had a reduced ability to kill C. elegans after growth in the urine of patients who consumed cranberry capsules.

J.P. LAVIGNE, G. BOURG, C. COMBESURE, H. BOTTO, A. SOTTO, ADHERENCE AND CRANBERRY CONSUMPTION. CLINICAL MICROBIOLOGY AND INFECTION 2008; 14:350-355.

NOVEMBER 2008 JOURNAL OF ANTIMICROBIAL CHEMOTHERAPY

This randomized controlled study compared the effectiveness of cranberry extract with low-dose trimethoprim in the prevention of recurrent urinary tract infections (UTIs) in older women.

M. MCMURDO, ET AL, CRANBERRY OR TRIMETHOPRIM FOR THE PREVENTION OF RECURRENT URINARY TRACT INFECTIONS? A RANDOMIZED CONTROLLED TRIAL IN OLDER WOMEN



STOMACH

DECEMBER 2000 – FEDERATION OF EUROPEAN MICROBIOLOGICAL SOCIETIES (FEMS)

A recently published study by researchers at Tel Aviv University, the Weizmann Institute of Science and Haifa Technion finds preliminary evidence that cranberry may also have an anti-adhesion effect on *H. pylori*, the bacteria that are a cause of stomach ulcers. The in vitro study, using human gastric mucus cells and a cranberry fraction, suggests that the cranberry's anti-adhesion effect may prevent the bacteria from attaching to the stomach lining, an important step in the progression of events leading to some ulcers.

BURGER O, ITZHAK O, TABAK M, WEISS EI, SHARON N, NEEMAN I. A HIGH MOLECULAR MASS CONSTITUENT OF CRANBERRY JUICE INHIBITS HELICOBACTER PYLORI ADHESION TO HUMAN GASTRIC MUCUS. FEDERATION OF EUROPEAN MICROBIOLOGICAL SOCIETIES 2000; 29:295-301.

SEPTEMBER 2003 – CHINESE JOURNAL OF DIGESTIVE DISEASES

This animal study found cranberry juice cocktail reducing *H. pylori* infection in mice. While cranberry juice was not found to be effective in eliminating *H. pylori* infection in the mice studied, the authors conclude consumption of cranberry juice was effective at suppressing *H. pylori* infection.

XIAO SD AND SHI T. IS CRANBERRY JUICE EFFECTIVE IN THE TREATMENT AND PREVENTION OF HELICOBACTER PYLORI INFECTION OF MICE? CHINESE JOURNAL OF DIGESTIVE DISEASES 2003; 4:136-139.

DECEMBER 2004 – DIAGNOSTIC MICROBIOLOGY AND INFECTIOUS DISEASE

This laboratory study found that compounds in cranberry inhibited antibiotic-resistant and nonresistant *H. pylori* from adhering to gastric cells. The authors note the data from this study suggest that a combination of antibiotics and cranberry may improve the elimination of *H. pylori*.

SHMUELY H, BURGER O, NEEMAN I, YAHAV J, SAMRA Z, NIV Y, SHARON N, WEISS E, ATHAMNA A, TABAK M, OFEK I. SUSCEPTIBILITY OF HELICOBACTER PYLORI ISOLATES TO THE ANTIADHESION ACTIVITY OF A HIGH-MOLECULAR-WEIGHT CONSTITUENT OF CRANBERRY. DIAGNOSTIC MICROBIOLOGY AND INFECTIOUS DISEASE 2004; 50:231-235.

MARCH 2005 – HELICOBACTER

This clinical study found daily consumption of cranberry juice suppressed *H. pylori* infection in the participants studied. The authors conclude this study suggests that regular consumption of cranberry juice may retard *H. pylori* infection in adults. Drinking cranberry juice daily may be a promising new tool in the worldwide management of this infection.

ZHANG L, MA J, PAN K, GO V, CHEN J, YOU W. EFFICACY OF CRANBERRY JUICE ON HELICOBACTER PYLORI INFECTION: A DOUBLE-BLIND, RANDOMIZED PLACEBO-CONTROLLED TRIAL. HELICOBACTER 2005; 10:139-145.

APRIL 2005 – PROCESS BIOCHEMISTRY

This study conducted at the University of Massachusetts shows that the cranberry, grape seed extract, wild blueberry synergy powder (**NurtriCran®GI**) provided by **Decas Botanical Synergies** inhibits *H. pylori* bacteria in vitro. *H. Pylori* is the leading cause of ulcers.

D.A. VATTEM, Y.-T. LIN, R. GHAEDIAN, K. SHETTY. CRANBERRY SYNERGIES FOR DIETARY MANAGEMENT OF HELICOBACTER PYLORI INFECTIONS. PROCESS BIOCHEMISTRY, 40(5): 1583-1592.

MARCH 2007 MOLECULAR NUTRITION & FOOD RESEARCH

A double-blind randomized clinical study was carried out and analysis by gender revealed that for female subjects, the eradication rate was higher in the cranberry-OAC arm than in the placebo-OAC arm and significantly higher than in the non-placebo-OAC group. These results suggest that the addition of cranberry to triple therapy improves the rate of *H. pylori* eradication in females.

H. SHMUELY, J. YAHAV, Z. SAMRA, G. CHODICK, R. KOREN, Y. NIV, I. OFEK, EFFECT OF CRANBERRY JUICE ON ERADICATION OF HELICOBACTER PYLORI IN PATIENTS TREATED WITH ANTIBIOTICS AND A PROTON PUMP INHIBITOR. MOLECULAR NUTRITION & FOOD RESEARCH 2007; 51:746-751.

JANUARY 2008 NUTRITION

The results from this trial suggest that regular intake of cranberry juice or La1 may be useful in the management of asymptomatic children colonized by *H. pylori*; however, no synergistic inhibitory effects on *H. pylori* colonization were observed when both foodstuffs were simultaneously consumed.

M. GOTTELAND, M. ANDREWS, M. TOLEDO, L. MUNOZ, P. CACERES, A. ANZIANI, E. WITTIG, H. SPEISKY, G. SALAZAR, MODULATION OF HELICOBACTER PYLORI COLONIZATION WITH CRANBERRY JUICE AND LACTOBACILLUS JOHNSONII LA1 IN CHILDREN. NUTRITION 2008;24:421-426.

JUNE 2008 NUTRITION

In vitro studies have reported that cranberry juice or probiotics can inhibit the adhesion of many pathogenic bacteria in the mouth, urinary tract, and gastro-intestinal tract. The new study supports this and strengthens the science by showing that cranberry and probiotics produced meaningful benefits in children.

STEPHEN DANIELLS, CRANBERRIES, PROBIOTICS MAY FIGHT UCLER-CAUSING BACTERIA IN CHILDREN. NUTRITION 2008



HEART

MAY 1998 LIFE SCIENCES

Early results from an in vitro study from the University of Wisconsin-LaCrosse suggest cranberry juice might promote cardiovascular health. In the study, cranberry juice proved to be an effective antioxidant, preventing LDL cholesterol from becoming oxidized. Oxidation of LDL cholesterol is believed to contribute to atherosclerosis.

WILSON T. PORCARI JP, HARBIN D. CRANBERRY EXTRACT INHIBITS LOW DENSITY LIPOPROTEIN OXIDATION, LIVE SCIENCES; 1998 62(24):381-386

SEPTEMBER 2000 – JOURNAL OF MEDICINAL FOOD

This in vitro study found that compounds in cranberry juice have a beneficial effect on the cardiovascular system similar to compounds in red wine. Additionally, this study found that cranberry juice reduced the blood pressure in the rats studied. The authors note this study suggest that regular consumption of cranberry juice may have a beneficial effect on the cardiovascular system, similar to red wine.

MAHER MA, MATA CZYNSKI H, STEFANIAK HM, WILSON T. CRANBERRY JUICE INDUCES NITRIC OXIDE-DEPENDENT VASODILATION IN VITRO AND ITS INFUSION TRANSIENTLY REDUCES BLOOD PRESSURE IN ANESTHETIZED RATS. JOURNAL OF MEDICINAL FOOD 2000; 3:141-147

NOVEMBER 2001 JOURNAL OF THE SCIENCE OF FOOD AND AGRICULTURE

Researchers at the University of Wisconsin-Madison tested a series of cranberry flavonoid fractions in vitro and find that some of them prevent LDL oxidation. Of the fractions tested, the cranberry proanthocyanidin fraction was most effective in protecting the LDL from oxidation.

PORTER ML, KRUGER CG, WIEBE DA, CUNNINGHAM DG, REED JD. CRANBERRY PROANTHOCYANIDINS ASSOCIATE WITH LOW-DENSITY LIPOPROTEIN AND INHIBIT IN VITRO CU²⁺-INDUCED OXIDATION. JOURNAL OF THE SCIENCE OF FOOD AND AGRICULTURE 2001; 81:1306-1313

MAY 2002 CRITICAL REVIEWS IN FOOD SCIENCE AND NUTRITION

This study examined cranberry's ability to decrease total cholesterol and LDL cholesterol in an animal study. Scientists find that regular intake of cranberry juice powder substantially reduced total cholesterol and LDL cholesterol in hypercholesterolemic pigs, marking the first time such an effect had been seen in vivo with cranberry.

REED JD. CRANBERRY FLAVONOIDS, ATHEROSCLEROSIS AND CARDIOVASCULAR HEALTH. CRITICAL REVIEWS IN FOOD SCIENCE AND NUTRITION 2002; 42:301-316

AUGUST 2004 AMERICAN CHEMICAL SOCIETY NATIONAL MEETING

This in vitro study conducted at the William Harvey Research Institute in England suggests that a serving of cranberry juice cocktail each day could be as good for the heart as red wine. Scientists tested cranberry juice cocktail, light cranberry juice cocktail, a California

merlot and an Argentine cabernet sauvignon and found similar results from promoting healthy arteries among all of these beverages.

CORDER R. ANTI-ATHEROSCLEROTIC POTENTIAL OF CRANBERRY JUICE AND RED WINE: COMPARABLE INHIBITION OF ENDOTHELIN-1 SYNTHESIS BY CULTURED ENDOTHELIAL CELLS. AMERICAN CHEMICAL SOCIETY NATIONAL MEETING 2004.

OCTOBER 2004 CANADIAN CARDIOVASCULAR SOCIETY ANNUAL CONGRESS

A clinical study conducted at Laval University in Quebec City, Canada, indicated that consuming a daily glass of light cranberry juice drink, improved circulation by increasing the level of HDL, or good cholesterol found in the bloodstream. Thirty men with slightly elevated LDL cholesterol levels consumed increasing daily doses of light cranberry juice cocktail. A 6.4% increase of HDL cholesterol levels were found among participants studied.

COUILLARD C. CANADIAN CARDIOVASCULAR SOCIETY ANNUAL CONGRESS MEETING. OCTOBER 23-27, 2004 CALGARY, ALBERTA.

JUNE 2007 BRITISH JOURNAL OF NUTRITION

This study was undertaken to determine the effect of the daily consumption of low-calorie cranberry juice cocktail on plasma OxLDL, intercellular adhesion molecule-1, vascular cell adhesion molecule-1 and E-selectin concentrations in men. The study noted a significant decrease in plasma OxLDL concentrations following the intervention. It also found that plasma ICAM-1 and VCAM-1 concentrations decreased significantly during the course of the study. In summary, the present results show that daily cranberry juice cocktail consumption is associated with decreases in plasma OxLDL, ICAM-1 and VCAM-1 concentrations in men.

G. RUEL, S. POMERLEAU, P. COUTURE, S. LEMIEUX, B. LAMARCHE, C. COUILLARD, LOW-CALORIE CRANBERRY JUICE SUPPLEMENTATION REDUCES PLASMA OXIDIZED LDL AND CELL ADHESION MOLECULE CONCENTRATIONS IN MEN. BRITISH JOURNAL OF NUTRITION 2008;99:352-359

NOVEMBER 2007 NUTRITION REVIEWS

Recently, research on the effects of cranberries and their components has also focused on their use in the prevention and treatment of cardiovascular disease (CVD). Epidemiological studies have consistently shown that the consumption of fruits and vegetables is inversely associated with the risk of developing CVD and stroke. The phytochemical constituents of these foods appear to contribute substantially to this benefit. Cranberries are a particularly rich source of phenolic phytochemicals.

DIANE MCKAY, JEFFREY BLUMBERG, CRANBERRIES (VACCINIUM MACROCARPON) AND CARDIOVASCULAR DISEASE RISK FACTORS. NUTRITION REVIEWS 2007: 490-502.



ANTIOXIDANT / CELL HEALTH

NOVEMBER 2001 JOURNAL OF AGRICULTURE AND FOOD CHEMISTRY

This study found that cranberries, compared to other fruits, appear to have a high level of antioxidants. On a fresh weight basis, cranberry had the highest concentration of polyphenols of the 20 fruits tested in the study, as well as the highest concentration of free phenols among these fruits.

VINSON JA, SU X, ZUBIK L, BOS P. PHENOL ANTIOXIDANT QUANTITY AND QUALITY IN FOODS. FRUITS, JOURNAL OF AGRICULTURE AND FOOD CHEMISTRY 2001; 49:5315-5321

DECEMBER 2002 JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

This study found cranberry to have the highest total phenolic content and highest total antioxidant activity compared to all other common fruits studied. The authors note phytochemicals, especially phenolics in fruits and vegetables are thought to be the primary bioactive compounds for the health benefits.

SUN J, CHU YG, WE X, LIU RH. ANTIOXIDANT AND ANTIPROLIFERATIVE ACTIVITIES OF COMMON FRUITS. JOURNAL OF AGRICULTURAL FOOD CHEMISTRY 2002; 50:7449-7454

MARCH 2004 JOURNAL OF NUTRITION

This study looked at the proanthocyanidin (PAC) content found in common foods in the U. S. food supply and the average daily intake of PACs in the U.S. population. This study found apples, chocolate and grapes to be the major sources of PACs in the diet, and that men aged 60+ years of age and children 2-5 years of age consume more PACs daily than other Americans because they eat more fruit. This study supports the idea that PACs are a major part of the total flavonoids consumed in Western diets.

GU L, KELM M, HAMMERSTONE J, BEECHER, G, HOLDEN J, DAYTOWITZ D, GEBHARDT S, PRIOR R. CONCENTRATIONS OF PROANTHOCYANIDINS IN COMMON FOODS AND ESTIMATIONS OF NORMAL CONSUMPTION. JOURNAL OF NUTRITION 2004; 134:613-617

JUNE 2004 JOURNAL OF AGRICULTURAL FOOD CHEMISTRY

This study looked at the total antioxidant capacity (TAC) per gram of 100 common foods. Researchers found that cranberries have the highest TAC per gram compared to all other fruits studied. Cranberries had a TAC of almost 95 per gram followed by wild blueberries (93), black plums (73), plums (62), and cultivated blueberries (62).

WU X, BEECHER, GR, HOLDEN JM, HAYTOWITZ D, GEBHARDT S, PRIOR R, LIPHOPHILIC AND HYDROPHILIC ANTIOXIDANT CAPACITIES OF COMMON FOODS IN THE UNITED STATES. JOURNAL OF AGRICULTURAL FOOD CHEMISTRY 2004; 52: 4026-4037

AUGUST 2004 USDA DATABASE FOR THE PROANTHOCYANIDIN CONTENT OF SELECTED FOODS

This study looked at the concentration of total proanthocyanidins in common foods. Researchers

found that cranberries have the highest concentration of total PACs per gram compared to all other fruits studied. Cranberries had a 418.8 mg/ 100g followed by wild blueberry (331.9), plum (215.9) cultivated blueberry (179.8) and strawberry (145.0).

U.S. DEPARTMENT OF AGRICULTURE, AGRICULTURAL RESEARCH SERVICE. USDA DATABASE FOR THE PROANTHOCYANIDIN CONTENT OF SELECTED FOODS 2004.

2005 – PROCESS BIOCHEMISTRY

The results of this in vitro suggested that the phenolics in the cranberry-oregano synergy powder provide by Decas Botanical Synergies reduced oxidative stress on porcine muscle through SOD and CAT stimulation. By stimulating SOD and CAT cranberry functions as antioxidant catalyst in the body.

D.A. VATTEM, R. RANDHIR, K. SHETTY. CRANBERRY PHENOLICS-MEDIATED ANTIOXIDANT ENZYME RESPONSE IN OXIDATIVELY STRESSED PORCINE MUSCLE PROCESS BIOCHEMISTRY 2005; 40:2225-2238

2007 THE JOURNAL OF NUTRITION

The unique combination of phytochemicals found in cranberry fruit may produce synergistic health benefits. Possible chemopreventive mechanisms of action by cranberry phytochemicals include induction of apoptosis in tumor cells, reduced ornithine decarboxylase activity, decreased expression of matrix metalloproteinases associated with prostate tumor metastasis, and anti-inflammatory activities including inhibition of cyclooxygenases. These findings suggest a potential role for cranberry as a dietary chemopreventive and provide direction for future research.

CATHERINE C. NETO, CRANBERRY AND ITS PHYTOCHEMICALS: A REVIEW OF IN VITRO ANTICANCER STUDIES. THE JOURNAL OF NUTRITION 2007;137:186S-193S.

2007 PHYTOMEDICINE

An experiment evaluated effect of drinking cranberry juice on bone quality in orchidectomized rats. Because cranberry juice, like citrus, is rich in nutrients and phenolic compounds, beneficial effects of citrus juice might also be seen with cranberry juice. It was concluded that cranberry juice increases plasma antioxidant status without affecting bone quality.

A. VILLARREAL, B.J. STOECKER, C. GARCIA, K. GARCIA, R. RIOS, C. GONZALES, K. MANDADI, B. FARAJI, B.S. PATIL, F. DEYHIM, CRANBERRY JUICE IMPROVED ANTIOXIDANT STATUS WITHOUT AFFECTING BONE QUALITY IN ORCHIDECTOMIZED MALE RATS. PHYTOMEDICINE 2007;14:815-820.



JANUARY 2007 MOLECULAR NUTRITION AND FOOD RESEARCH

Growing evidence from tissue culture, animal, and clinical models suggests that the flavonoid-rich fruits of the North American cranberry and blueberry have the potential ability to limit the development and severity of certain cancers and vascular diseases including atherosclerosis, ischemic stroke, and neurodegenerative diseases of aging.

CATHERINE C. NETO, CRANBERRY AND BLUEBERRY: EVIDENCE FOR PROTECTIVE EFFECTS AGAINST CANCER AND VASCULAR DISEASES. MOLECULAR NUTRITION AND FOOD RESEARCH 2007;51:652-664.

FEBRUARY 2007 JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

This study assessed the effect of an 8 week consumption of dried cranberry juice (DCJ) on 65 healthy young women. A 1200 mg amount of DCJ/day resulted in a statistically significant decrease in serum levels of advanced oxidations protein products. Researchers concluded cranberry fruits are effective not only in the prevention of urinary tract infection but also for the prevention of oxidative stress.

K. VALENTOVA, D. STEJSKAL, P. BEDNAR, J. VOSTALOVA, C. CIHALIK, R. VECEROVA, D. KOUKALOVA, M. KOLAR, R. REICHENBACK, L. SKNOURIL, J. ULRICOVA, V. SIMANEK, BIOSAFETY, ANTIOXIDANT STATUS, AND METABLITES IN URINE AFTER CONSUMPTION OF DRIED CRANBERRY JUICE IN HEALTHY WOMEN: A PILOT DOUBLE-BLIND PLACEBO-CONTROLLED TRIAL. JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY. P. 7.2-7.3

OCTOBER 2007 THE ROYAL SOCIETY OF CHEMISTRY

Results demonstrate that quercetin and other cranberry phenolics can effectively modulate iron biochemistry under physiologically relevant conditions, providing insight into the mechanism of action of bio-active phenolics.

M GUO, ET AL, IRON-BINDING PROERTIES OF PLANT PHENOICS AND CRANBERRY'S BIO EFFECTS 2007, 4951-4961

NOVEMBER 2007 JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

A number of recent in vitro and limited in vivo investigations have reported that cranberry extracts affect multiple cancer-associated processes in breast, colon, prostate, and other cancer cell lines of epithelial origin. Thus, this study sought to investigate the chemopreventive potential of a cranberry proanthocyanidin rich extract (PAC) in SEG-1 human esophageal adenocarcinoma (EAC) cells. Findings support further mechanistic studies are warranted to more fully elucidate the inhibitory potential of PAC against esophageal cancer.

LAURA A. KREST, AMY B. HOWELL, MAUREEN BAIRD, CRANBERRY PROANTHOCYANIDINS INDUCE APOPTOSIS AND INHIBIT ACID-INDUCED PROLIFERATION OF HUMAN ESOPHAGEAL ADENOCARCINOMA CELLS. JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY 2008;56:676-680.



DENTAL

DECEMBER 1998 – JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

Laboratory research from Tel Aviv University suggests that compounds in cranberries may inhibit certain bacteria found in the mouth from sticking to teeth leading to the development of plaque, apparently through the same type of anti-adhesion mechanism through which they maintain urinary tract health. These bacteria have been associated with periodontal gum disease.

WEISS EI, LEV-DOR R, KASHMAN Y, GOLDHAR J, SHARON N, OFEK I. INHIBITING INTERSPECIES COAGGREGATION OF PLAQUE BACTERIA WITH A CRANBERRY JUICE CONSTITUENT. JOURNAL OF THE AMERICAN DENTAL ASSOCIATION 1998; 129:1719-1723.

MAY 2004 INTERNATIONAL ASSOCIATION OF DENTAL RESEARCH (IADR) CONFERENCE

Two separate presentations by researchers from University of California, Los Angeles and University of Illinois were made at the International Association of Dental Research (IADR) supporting cranberry's potential role in oral health. These laboratory studies also support the role of cranberry in inhibiting both the growth and biofilm formation of *S. mutans*, as well as inhibiting the growth and viability of other oral pathogens.

WU CD, ZHU M, TURNER A, PAUL GF, FARNSWORTH NR. CRANBERRY EXTRACTS INHIBIT GROWTH/VIABILITY OF ORAL PATHOGENS AND BIOFILMS PRESENTED AT IADR 2004; 0746. CHEN L, HEBER D, HARDY M, SEERAM N, HENIG S, LEAHY M. WOLINSKY L, QI F, SHI W. INHIBITORY EFFECTS OF CRANBERRY ON STREPTOCOCCUS MUTANS BIOFILM FORMATION. PRESENTED AT IADR 2004; 291



JUNE 2004 – JOURNAL OF ORAL MICROBIOLOGY IMMUNOLOGY

Laboratory research from Tokyo Dental College in Chiba, Japan further supports cranberry's anti-adhesion mechanism on strains of oral bacteria such as streptococci as well as the formation of biofilm within the oral cavity. These findings suggest that cranberry compounds can help decrease oral bacteria (streptococci) on the tooth surface, thus, slowing development of dental plaque.

YAMANAKA A, KIMIZUKA R, KATO T, OKUDA K. INHIBITORY EFFECTS OF CRANBERRY JUICE ON ATTACHMENT OF ORAL STREPTOCOCCI AND BIOFILM FORMATION. JOURNAL OF ORAL MICROBIOLOGY IMMUNOLOGY 2004; 19(3):150-154.

JUNE 2004 – JOURNAL OF ANTIMICROBIAL CHEMOTHERAPY

This clinical study out of Israel investigated the effect of a mouthwash supplemented with a cranberry extract on oral hygiene. The study found that following 6 weeks of daily usage of cranberry-containing mouthwash by an experimental group, certain oral pathogens (Streptococcus mutans) as well as the total bacterial count were reduced significantly. Additional in vitro work suggested that the ability to reduce these pathogen counts in vivo is due to the anti-adhesion activity of the cranberry constituent.

STEINBERG D, FELDMAN M, OFEK I, WEISS EI. EFFECT OF A HIGH-MOLECULAR-WEIGHT COMPONENT OF CRANBERRY ON CONSTITUENTS OF DENTAL BIOFILM. JOURNAL OF ANTIMICROBIAL CHEMOTHERAPY 2004; 1093-

ANTI-BACTERIAL

2004 – APPLIED AND ENVIRONMENTAL MICROBIOLOGY

Optimized phenolics from oregano and cranberry extracts donated by Decas Botanical Synergies were evaluated for antimicrobial activity against *Listeria monocytogenes* in laboratory media and in beef and fish. This study illustrates the cranberries capability to serve as a natural bio-preservative in the food market.

Y. T. LIN, R. G. LABBE, AND D KALIDAS SHETTY. INHIBITION OF LISTERIA MONOCYTOGENES IN FISH AND MEAT SYSTEMS BY USE OF OREGANO AND CRANBERRY PHYTOCHEMICAL SYNERGIES. APPLIED AND ENVIRONMENTAL MICROBIOLOGY, SEPT. 2004, P. 5672-5678

2004 – INNOVATIVE FOOD SCIENCE AND EMERGING TECHNOLOGIES

This in vitro study conducted at the University of Massachusetts shows that a cranberry and oregano synergy powder donated by Decas Botanical Synergies can inhibit *V. parahaemolyticus* in seafood systems. This study builds on earlier work that demonstrates the cranberries capability to serve as a natural bio-preservative in the food market.

Y. T. LIN, R. G. LABBE, AND KALIDAS SHETTY. INHIBITION OF *VIBRIO PARAHAEMOLYTICUS* IN SEAFOOD SYSTEMS USING OREGANO AND CRANBERRY PHYTOCHEMICAL SYNERGIES AND LACTIC ACID. INNOVATIVE FOOD SCIENCE AND EMERGING TECHNOLOGIES, 6: 453-458.

MARCH 2008 ANALYTICAL CHEMISTRY

The binding of LPS by PACs has been shown to compete with that of polymyxin B which is known to bind the lipid A component of LPS. Assays conducted in the presence of lipid A verified that at least some component of the LPAS binding activity of the PACs is via the lipid A moiety. Molar comparison of polymyxin B to Proanthocyanidins indicated that the Sepharose immobilized PACs have a binding affinity for LPS similar to that of polymyxin B.

BRANDY JOHNSON, JAMES DELEHANTY, BAOCHUAN LIN, FRANCES LIGER, IMMOBILIZED PROANTHOCYANIDINS FOR THE CAPTURE OF BACTERIAL LIPOPOLYSACCHARIDES, ANALYTICAL CHEMISTRY 2008;80:2113-2117.

ANTI-VIRAL

2005 ANTIVIRAL RESEARCH

This in vitro study conducted in Israel showed the inhibitory effect of cranberry NDM extract on influenza virus adhesion and infectivity. The study concludes that cranberry NDM could be used control influenza viral infections and may help prevent secondary bacterial infections as well.

E.I. WEISS, Y. HOURI-HADDAD, E. GREENBAUMB, N. HOCHMAN, I. OFEK, Z. ZAKAY-RONES. CRANBERRY JUICE CONSTITUENTS AFFECT INFLUENZA VIRUS ADHESION AND INFECTIVITY. ANTIVIRAL RESEARCH 2005; 66:9-12.

